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Fast launch speeds in radio flares, from a new determination of the intrinsic motions of SS 433's jet bolides

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Abstract

© 2016 The Authors Published by Oxford University Press on behalf of the Royal Astronomical Society.We present newhigh-resolution, multi-epoch, Very Long BaselineArray (VLBA) radio images of the Galactic microquasar SS 433. We are able to observe plasma knots in the milliarcsecondscale jets more than 50 d after their launch. This unprecedented baseline in time allows us to determine the bulk launch speed of the radio-emitting plasma during a radio flare, using a new method which we present here, and which is completely independent of optical spectroscopy. We also apply this method to an earlier sequence of 39 short daily VLBA observations, which cover a period in which SS 433 moved from quiescence into a flare. In both data sets we find, for the first time at radio wavebands, clear evidence that the launch speeds of the milliarcsecond-scale jets rise as high as 0.32c during flaring episodes. By comparing these images of SS 433 with photometric radio monitoring from the RATAN-600 telescope, we explore further properties of these radio flares.

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Keywords

Accretion, accretion discs, ISM: jets and outflows, Stars: individual: SS 433